

## **Influence of intensive training on salivary flow, on salivary pH and on salivary lactate concentration: consequences for oral health**

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**Introduction:** During physical activity lactate concentration increases in blood and it is excreted into the saliva <sup>[1]</sup>. Moreover, if there is not a fluid reestablishment, a dehydration status may be achieved and in combination with oral breathing it can reduce saliva's volume <sup>[2]</sup>. In addition, during exercise there is a stimulation of sympathetic nervous system, which induces changes on saliva's composition and volume <sup>[3]</sup>. Altogether, these factors decrease saliva's functions and increase the risk of dental erosion and caries. The association of physical exercise with the consumption of a diet rich in carbohydrates and acidic substances, which also lead to decrease of saliva's pH, further increases the dental erosion and caries risk <sup>[4]</sup>. The objective of this work was to determine whether intensive physical exercise influences variables related to saliva (flow, pH and lactate concentration) and if there is a relationship between body water and salivary variables and prevalence of dental erosion and caries; In addition, we want to determine how athletes perceive the relationship between physical activity and oral health.

**Methodology:** This observational study comprised a convenience sample of 30 athletes, 18 male and 12 female, aged 18 – 40 years, selected from 3 sports clubs. The athletes were observed before and immediately after a session of intensive training. A questionnaire about oral health, nutrition and physical exercise, an intraoral clinical examination, an anthropometrical evaluation to characterize body composition and a collection of not stimulated and stimulated saliva samples were undertaken. SPSS software was used for statistic analyse, included t-student test, wilcoxon test and non-parametric correlations.

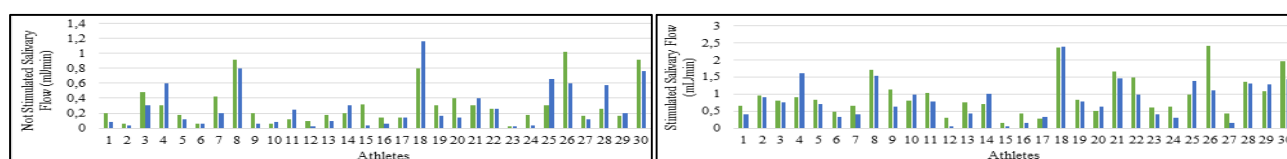
**Results and Discussion:** We observed for just a few athletes a decrease in not-stimulated salivary flow justified because of the possible combination among stimulation of sympathetic nervous system, dehydration status and oral breathing <sup>[2, 3]</sup>. On the contrary, a small increment in not-stimulated saliva's pH was monitored in some athletes. The increase of saliva's pH may be a consequence of the decrease in salivary flow <sup>[4]</sup>. However, the changes observed were not higher than 0,5 and, in any case, decrease to 5.5, the critical pH for dental demineralization <sup>[5]</sup>. These data is in agreement with the relationship found between saliva's pH (both not-stimulated and stimulated) and low incidence of dental caries among these athletes. Dental caries is a multifactorial disease so not depending only on saliva's pH and flow <sup>[5]</sup>. A similar relationship was found with lactate concentration probably because the in these athletes is associated with neutral salivary pH and constant salivary flow which neutralize the acid effect <sup>[5]</sup>. There wasn't a relationship between the total body water percentage before and after training and the salivary flow.

The athletes don't have a real perception concerning their own oral health, however they recognized its importance and the influence on sports performance.

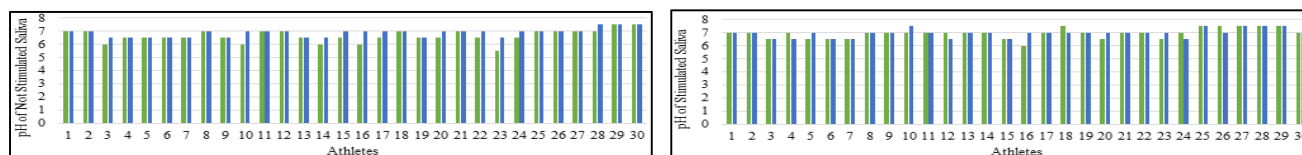
**Conclusion:** Although it is known that intensive training may affect some salivary variables (flow and pH), we found a higher variability among athletes after training. More studies are needed to better characterize this relationship.

## References:

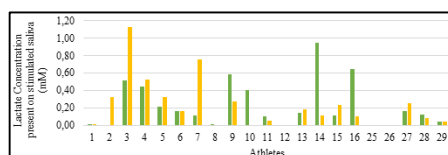
- [1] Santos, R. *et al.* (2006). Effects of a 30-km race upon salivary lactate correlation with blood lactate. *Comparative Biochemistry and Physiology, Part B* 145, 114–117.
- [2] Rodrigues, R. *et al.* (2011, outubro). Influência do estado de hidratação sobre a capacidade de produção de força após exercício no calor com e sem ingestão hídrica. Em *XII Salão de Iniciação Científica - PUCRS*.
- [3] Almeida, P. *et al.* (2008, março 1). Saliva composition and functions: A comprehensive review. *The Journal of Contemporary Dental Practice*, 9(3), 72–80.
- [4] Frese, C. *et al.* (2014, junho). Effect of endurance training on dental erosion, caries, and saliva. *Scandinavian Journal of Medicine and Science in Sports*, 25(3), 319–26.
- [5] Sala, E. C. & García, P. B. (2013). *Odontologia preventiva y comunitaria - Principios, métodos y aplicaciones* (4<sup>a</sup> ed.). Barcelona: Elsevier Masson.



**Figure 1 and 2.** Comparison between Not Stimulated Salivary Flow (Figure 1) and Stimulated Salivary Flow (Figure 2) before training (Green) and after training (Blue)



**Figure 3 and 4.** Comparison between pH of Not Stimulated Saliva (Figure 3) and pH of Stimulated Saliva (Figure 4) before training (Green) and after training (Blue)



**Figure 5.** Comparison between lactate concentrations present on stimulated saliva before training (Green) and after training (Yellow)